INF.15

ECONOMIC COMMISSION FOR EUROPE

INLAND TRANSORT COMMITTEE

Working Party on the Transport of Dangerous Goods

Joint Meeting of the RID Safety Committee and the Working Party on the Transport of Dangerous Goods
(Geneva, 1 - 10 September / 13 – 17 October 2003)

Chapter 6.10
Subclause 6.10.3.9

Transmitted by the Government of the Netherlands

Summary:	The intention of this document is, to express the reservations of the Netherlands with regard to the decisions, taken in the Joint Meeting of March 2003 concerning the safety valve and bursting disc on vacuum-operated waste tanks in accordance with Chapter 6.10, based on investigations in the Netherlands' practice and exercises with the formula in 6.7.3.8.1.1
Action to be taken:	reconsider the fifth paragraph of 6.10.3.9, as mentioned in document TRANS/WP.15/AC.1/92/Add. 2, in accordance with the outcome of the Dutch studies and agree on a practical value for the size of the safety valve.
Reference documents:	TRANS/WP.15/AC.1/92/Add.1 and Add.2, INF. 50

Introduction:

A. history

The decision to equip these tanks with a safety valve was taken as a measure after some accidents in the Netherlands where the tank burst due to gradual pressure rise inside the tank, this pressure rise being the result of a chemical reaction between several successively loaded substances.

Because the safety valves for loading and discharge operations are deliberately placed on the piping system and not on the tank itself, such a pressure rise could not be detected during carriage. The simplest effective solution turned out to be the placing of a relatively small safety relief valve on the shell itself, set at the highest technical allowable pressure and preceded by a bursting disc to prevent obstruction of the valve by the carried substances.

It may be clear that the combination of the safety valve and the bursting disc in this case, has a different function than that of a hermetically closed tank.
This requirement was introduced by the Netherlands in the ADR Working Group on vacuum operated waste tanks and adopted there as it was, without a specification of the valve or the bursting disc.

B. present

During last Joint Meeting a proposal for a specification of the valve and the bursting disc was adopted, with a reservation concerning the minimum size. Below, two of the requirements are commented:

1. Capacity formula of 6.7.3.8.1.1:

- 6.7.3.8.1.1 is dealing with gas tanks; 6.7.2.12.2.1 is the similar part dealing with liquids and so seems more appropriate. Although the formula is identical in both parts, only in 6.7.2.12.2.3 a short cut table appears, which is the most common means for the determination of the capacity of valves for tank containers and portable tanks;
- particularly for vacuum operated waste tanks in which an almost unlimited range of substances may be carried, the use of the formula itself is not practical, if possible at all;
- the determination of the capacity with this formula is based on an amount of gases, generated in full fire conditions. The purpose of the valve in question however, is definitely not. ADR does not require such a safety precaution for tanks for liquids. It would thus mean an unjustified discrimination of vacuum-operated waste tanks;
- an example that shows that the formula is not applicable to ADR tanks is, that for an IMO type 4 tank, which is an ADR tank vehicle, approved for short sea voyages only a small (1¼" or 31,75 mm) safety valve, based on the vapour pressure (see 6.7.2.8.1 and 6.7.2.12.1) is sufficient, whereas a portable (insulated!) tank has to be equipped with one or two large (2½" or 63,5 mm) valves in accordance with 6.7.2.12.2.1;
- application of the formula (as worked out in table 6.7.2.12.2.3) in some practical cases shows the following:

    - A common valve, used with portable tanks, the 2½" Maxi Highflow valve, has, according to the table, provided by the manufacturer a capacity of 5640 m^3/h = 1.57 m^3/s at 1 bar;
    - For a 12.000 litre vehicle tank the total exposed area is approximately 32 m^2. According to the table, a capacity of the valve of 2.2 m^3/s at 1 bar and 0˚C would be required. This means that mounting of more than one of the above mentioned valves would be required!;
    - For a 30.000 litre semi-trailer tank however the exposed area is approximately 72 m^2. This results in a capacity of about 4.3 m^3/s. In this case the number of such valves would even be more than two!;

- The consequence of this result is that also bursting discs of that size have to be mounted. Given the rough circumstances in practice, it has to be expected that these bursting discs have to be replaced every now and then. Requiring a larger size or number than technically justified, would lead to unnecessary increasing costs;

2. Minimum size:

As stated above, the size of 50 mm, placed between square brackets in the report of the last Joint Meeting, is subject of discussion. The reasons for the Netherlands not to agree with this value are:

- based on the capacity formula in 6.7, the minimum possible size would be 63.5 mm, according to the result of the above calculations. In that situation it would be meaningless to specify a lower value;
- in the description above, the Netherlands has however explained that the application in the Netherlands (and in Belgium) of a 31,75 mm (1¼") valve serves the purpose perfectly; a larger size is not useful;
- the Netherlands is of the opinion that, instead of making reference to 6.7.2.12.2.1 (or 6.7.12.2.3) a better base for the specification of the safety valve in question can be found in 6.7.2.8.1 (*"Every portable tank with a capacity not less than 1 900 litres and every independent compartment of a portable tank with a similar capacity, shall be provided with one or more pressure-relief devices of the spring-loaded type and may in addition have a frangible disc or fusible element in parallel with the spring loaded devices except when prohibited by reference to 6.7.2.8.3 in the applicable portable tank instruction in 4.2.5.2.6. The pressure-relief devices shall have sufficient capacity to prevent rupture of the shell due to over pressurization or vacuum resulting from filling, discharging, or from heating of the contents"*) and in 6.7.2.12.1 (*"The spring loaded pressure-relief device required by 6.7.2.8.1 shall have a minimum cross sectional flow area equivalent to an orifice of <u>31,75 mm diameter</u>. Vacuum-relief devices ….etc."*)
- a 31,75 mm (1¼") valve is commonly available and widely used on pressure equipment of tank vehicles etc.; a 50 mm (2") valve is not a common one;
- in this case maintenance of the tank with regard to the corresponding bursting disc is also less costly.

<u>Proposal :</u>

Amend 6.10.3.9 as follows:

> "The shells of vacuum-operated waste tanks shall be fitted with a safety valve preceded by a bursting disc.
>
> The valve shall be capable of opening automatically ~~under~~ *<u>at</u>* a pressure between 0.9 and 1.0 times the test pressure of the tank to which it is fitted. The use of dead weight or counterweight valves is prohibited.
>
> The bursting disc shall burst at *<u>the</u>* earliest when the initial opening pressure of the valve is reached and at *<u>the</u>* latest when this pressure reach*<u>es</u>* the test pressure of the tank to which it is fitted.

Safety devices shall be of such a type as to resist dynamic stresses , including liquid surge.
~~The required capacity of the safety devices shall be calculated in accordance with the formula contained in 6.7.3.8.1.1.~~

The pressure-relief devices shall have sufficient capacity to prevent rupture of the shell due to overpressurization resulting from filling, discharging, or from heating or decomposition of the contents. [derived from 6.7.2.8.1, see above]

They shall have a minimum cross sectional flow area equivalent to an orifice of 31,75 mm diameter [derived from 6.7.2.12.1, see above]

~~They shall be of a minimum internal diameter of [50] mm.~~ The space between the bursting disc and the safety valve shall be provided with a pressure gauge.

The transitional measures contained in doc. TRANS/WP.15/AC.1/92/Add.2 are not affected by this proposal.

Safety: the proposed amendments will not affect safety adversely.

Feasibility: no problems.

Enforceability: no problems.

Economical aspects: positive.

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